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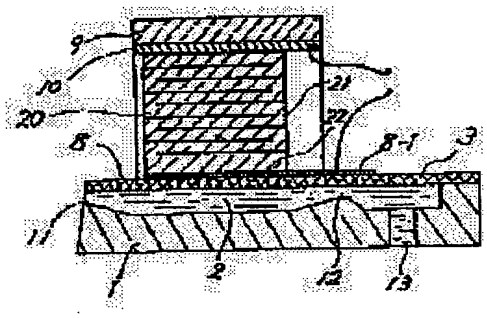
(72)Inventor : KOTO HARUHIKO

(54) INK-JET HEAD AND MANUFACTURE THEREOF

(57)Abstract:
PURPOSE: To provide an ink-jet head, in which no crosstalk is generated and a piezoelectric element and a diaphragm are connected uniformly, and manufacture thereof.
CONSTITUTION: A piezoelectric element constituted by alternately arranging one electrodes 21 exposed from one side face of a piezoelectric material and electrodes 22 having the other poles exposed from the other side face in the piezoelectric material is fixed to a rigid member 9, and grooves for separating at least the front end side of the piezoelectric element are formed on the free end side of the piezoelectric element and the piezoelectric element is divided into a plurality of elements. An ink-jet head is composed of a pressure means polarizing the piezoelectric material in the same direction as the direction of an electric field between the electrodes 22 and given a piezoelectric strain constant d33, a 2 diaphragm 3 abutting against the free ends of a plurality of the elements while a periphery thereof is supported by the rigid member, a pressure chamber 2 pressed through the diaphragm 3 by each element and a substrate having a nozzle opening 11, from which ink from the pressure chamber is injected.



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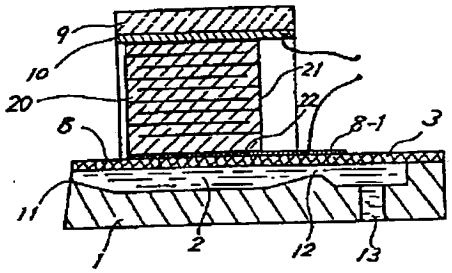
(54)【発明の名称】　インクジェットヘッド及びその製造方法

(57)【要約】
【目的】　クロストークがなく、圧電素子と振動板の接続が均一に行えるインクジェットヘッド及びその製造方法を提供する。
【構成】　圧電材料４０内に、その一側面から露出する一方の電極２１と、他側面から露出する他方の極の電極２２を交互に配置して構成された圧電素子４を剛性部材９に固定し、前記圧電素子の自由端側に少なくともその先端側を分離するための溝７を形成して複数の素子に分割するとともに、前記圧電材料を電極間の電界方向と同方向に分極させて圧電歪定数d_{33}を持たせた加圧手段と、前記複数の素子の自由端に当接するとともに前記剛性部材に周縁が支持された振動板３と、前記各素子により振動板を介して加圧される加圧室２、及び加圧室からのインクを噴射するノズル開口１１を備えた基板とからなることを特徴とする。



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【特許請求の範囲】

【請求項１】　圧電材料内に、その一側面から露出する一方の電極と、他側面から露出する他方の極の電極を交互に配置して構成された圧電素子を剛性部材に固定し、前記圧電素子の自由端側に少なくともその先端側を分離するための溝を形成して複数の素子に分割するとともに、前記圧電材料を電極間の電界方向と同方向に分極させて圧電歪定数d_{33}を持たせた加圧手段と、
前記複数の素子の自由端に当接するとともに前記剛性部材に周縁が支持された振動板と、
前記各素子により振動板を介して加圧される加圧室、及び加圧室からのインクを噴射するノズル開口を備えた基板と、
からなるインクジェットヘッド。

【請求項２】　前記圧電素子は、加圧室の長手方向に矩形に配置され、前記電極は圧電素子の長手方向の両側面から櫛歯状に交互に積層されていることを特徴とする請求項１記載のインクジェットヘッド。

【請求項３】　圧電材料内に、その一側面から露出する一方の電極と、他側面から露出する他方の極の電極を交互に配置した、電極間の電界方向と同方向に分極する圧電歪定数d_{33}を持つ圧電素子を剛性部材に固定する工程と、
前記圧電素子の自由端側に前記剛性部材側が深さとなる溝を所定のピッチで形成して複数の素子を分割する工程と、
前記各素子の先端と加圧室を振動板を介して当接させてその周縁部を前記剛性部材に固定する工程と、
からなるインクジェットヘッドの製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、圧電素子を用いたオンデマンド型インクジェットヘッドに係わり、特に多数のノズルを高密度に集積したマルチノズルヘッドの構造及びその製造方法に関する。

【０００２】

【従来の技術】オンデマンド型インクジェットは構造が簡単なため低価格の印刷装置として開発が進められている。インクの射出は圧電素子の変形によって行われ、従来は分極に対して垂直方向の変形すなわち圧電歪定数d_{31}に基因する変形を利用していた。例えば従来のユニモルフを用いたヘッドを図４に示すと、振動板１０１に積層された圧電振動子１０２は図の（３軸）の向きに分極されており、上下に設けられた電極１０３、１０４間に電圧を印加することで（１軸）方向に圧電振動子を縮ませ、振動板１０１と圧電素子１０２でバイメタルのように曲げ変形を起こし、加圧室１０５の容積を変形させる。圧電素子の変形は電界に比例し、変形方向の長さに比例するから、図４に示した従来例の構造は薄い（３軸）方向に電圧を印加することで電界を大きくし、素子の長い（１軸）方向の変位を利用することで変形を大きくしていた。

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【０００３】一方分極方向と垂直の圧電歪定数d_{31}の変形を利用する他の従来例を図５に示す。この例では圧電素子の（１軸）方向の振動板１０１と垂直に配置し、（１軸）方向の変形により振動板１０１をたわませる。この例でも図４の例と同じく、薄い方向に電圧を印加し、長い方向に変形を発生させて駆動電圧が上がらないようにしている。

【０００４】

【発明が解決しようとする課題】以上述べた従来例では比較的駆動電圧が上がらないという利点はあるが、ノズル数を多くし高密度に集積化する事が難しかった。例えば１０本／ｍｍ程度に加圧室を集積化すると、図４の例では圧電素子の（１軸）方向の長さが短くなって変形がとれず、駆動電圧が余りに高くなってしまい、また図５の例では多数の圧電素子を隣接させて並べる必要があり、隣同士の電極を短絡させずに、しかも１０本／ｍｍに並べることは技術的にも難しく、量産性が殆どなかった。

【０００５】したがって、本発明の目的は高集積化されたマルチノズルヘッドを提供するとともにクロストークがないインクジェットヘッドを提供することにある。

【０００６】また、本発明の他の目的は圧電素子と振動板を確実に接続することが可能なインクジェットヘッドの製造方法を提供することにある。

【０００７】

【課題を解決するための手段】本発明のインクジェットヘッドは、圧電材料内に、その一側面から露出する一方の電極と、他側面から露出する他方の極の電極を交互に配置して構成された圧電素子を剛性部材に固定し、前記圧電素子の自由端側に少なくともその先端側を分離するための溝を形成して複数の素子に分割するとともに、前記圧電材料を電極間の電界方向と同方向に分極させて圧電歪定数d_{33}を持たせた加圧手段と、前記複数の素子の自由端に当接するとともに前記剛性部材に周縁が支持された振動板と、前記各素子により振動板を介して圧縮を受ける加圧室、及び加圧室からのインクを噴射するノズル開口を備えた基板と、からなることを特徴とする。

【０００８】また、本発明のインクジェットヘッドの製造方法は、圧電材料内に、その一側面から露出する一方の電極と、他側面から露出する他方の極の電極を交互に配置した、電極間の電界方向と同方向に分極する圧電歪定数d_{33}を持つ圧電素子を剛性部材に固定する工程と、前記圧電素子の自由端側に前記剛性部材側が深さとなる溝を所定のピッチで形成して複数の素子を分割する工程と、前記各素子の先端と加圧室を振動板を介して当接させてその周縁部を前記剛性部材に固定する工程と、からなることを特徴とする。

【０００９】

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【実施例】以下図面を用いて本発明の実施例を詳細に説明する。

【００１０】図１は、本発明の一実施例として流路の軸に対し垂直方向に切った断面図を示す。１はポリサルフォンの基板で表面にインク流路が溝として形成されている。図１にはインク流路のうち加圧室２の断面を示す。加圧室の幅Ｗｃは８０μｍ、どての巾Ｗｄは２０μｍで加圧室は１００μｍピッチで配列されている。加圧室の深さＤｃは３０μｍである。３はポリサルフォン振動板で厚さ１０μｍであり、基板１に積層されている。４は全ての加圧室を覆う圧電素子で上下に電極５、６を有し、溝７によって各加圧室に対応するように上部を残して分割されている。振動板３と圧電素子４は振動板３の表面に設けられた電極８に接着されている。

【００１１】圧電素子の各加圧室に対応する部分の巾Ｗｐは５０μｍ、長さＬｐは３００μｍ、電極間距離Ｌｅは３５０μｍである。９は電極１０を介して圧電素子４の電極５に積層された剛性部材で、両端がコの字型に曲がり、振動板３に接着されており振動板３の厚さにくらべ充分厚い厚さＬｇを有する。この例ではＬｇは１ｍｍである。

【００１２】以上の構成においてその製造方法を図２により説明する。

【００１３】基板１は射出成形によって作られ、ノズル１１、供給路１２、供給管１３等のインク流路が加圧室２とともに形成される。その後表面に振動板３を溶剤接着しヘッド体を形成する。振動板３の表面に金属薄膜をスパッタし、エッチングにより図に示すような電極８を形成する。一方剛性部材９はポリサルフォンの射出成形で作り、下面に電極１０をスパッタにより形成する。さらに上面、下面に電極５，６を有する圧電材料４０を剛性部材９に接着し、ダイヤモンドソーで溝７を形成し圧電素子４を形成する。さらに剛性部材９、圧電素子４を振動板３に接着し、電極８の後部８－１に図示されていない制御回路からの配線を行う。

【００１４】図１、図２の実施例ではノズル数４つのヘッドを示しているが、実際には２４ノズルないし２０００ノズルのヘッドを作成することができる。

【００１５】次に上記実施例の動作を説明する。

【００１６】流路内にインクを満たし、電極８と電極１０の間に図示されていない制御回路からの駆動信号を印加すれば、電極５，６を介して圧電素子４に電圧が印加される。このとき電圧をＶとすれば圧電素子４には、$\varepsilon = d_{33}V/Le$の歪が発生し、これにより振動板３をたわませ加圧室２内のインクを加圧してノズル１１から射出し記録を行う。剛性部材９の厚さＬｇは振動板３にくらべ１００倍あるから曲げ剛性は$100^3 = 10^6$倍となり、圧電素子４の変形はほとんど全て振動板３に伝わる。一般的には剛性部材の曲げ剛性が振動板の１００倍以上あれば良い。

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【００１７】上記実施例でわかるように圧電素子の分極方向の変形を利用することで、多数の加圧室に対する圧電素子が容易に配置でき、マルチノズルヘッドの高集積化が可能となる。

【００１８】また分極方向と同じ圧電歪定数ｄ３３の値は通常分極方向と垂直の圧電歪定数ｄ３１の値の２倍ないし３倍であるから、電極５，６間の距離が比較的長いにもかかわらず歪みは大きくとれるという利点がある。

【００１９】なお上記実施例では、電極５，６，８，１０を設けているが、電極５と電極１０、電極６と電極８を同一部材として電極数を少なくすることができる。また剛性部材９を金属とすれば電極１０を兼ねることができる。また溝７は圧電素子４の途中まで入れてあるが、これは圧電素子４の剛性部材９との接合強度を上げるためである。接合強度が充分ならば隣合う圧電素子の相互影響を下げ、電圧のロスを少なくするために圧電素子が全て切り離されるまで切り込んでも良い。

【００２０】図３に本発明の他の実施例として流路に沿って切断した断面を示す。図１、図２の実施例と異なり、圧電素子２０は５０μｍの素子を９層積層したもので電極２１，２２が素子間に設けられている。圧電素子２０は加圧室２の長手方向に矩形に配置され、電極２１，２２は、供給路側，ノズル側から櫛歯状に形成され交互に積層されている。圧電素子に印加される電界は図１に比べ約１／９となり、図１の例が８０Ｖの駆動電圧を必要としたのに対し１０Ｖ以下で良くなり、特に２０００ノズルというような多数ノズルを駆動する場合はドライバＩＣ化という点で有利である。

【００２１】

【発明の効果】以上のように本発明によれば、加圧室上の振動板の周縁部が剛性部材により固定されているため、加圧室に加わる圧力による加圧室を有する基板のたわみ変形を防止でき、クロストークが防止できる。また、圧電素子の電極を加圧室の長手方向に櫛歯状に交互に積層することにより変位を大きくとることができ、さらに電極位置のバラツキの影響を小さくすることができる。

【００２２】さらに、本発明の製造方法によれば、振動板の周縁部を剛性部材により固定することにより、振動板のたわみを矯正することができ、均一に圧電素子の先端を振動板に当接させることができる。

【図面の簡単な説明】

【図１】本発明のインクジェットヘッドの一実施例を示す図２の断面図である。

【図２】本発明のインクジェットヘッドの一実施例を示す斜視図である。

【図３】本発明のインクジェットヘッドの他の実施例を示す斜視図である。

【図４】従来のインクジェットヘッドの概略断面図である。

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【図５】従来のインクジェットヘッドの概略断面図である。

【符号の説明】

１・・・基板

２・・・加圧室

３・・・振動板

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４，２０・・・圧電素子

５，６，８，１０，２１，２２・・・電極

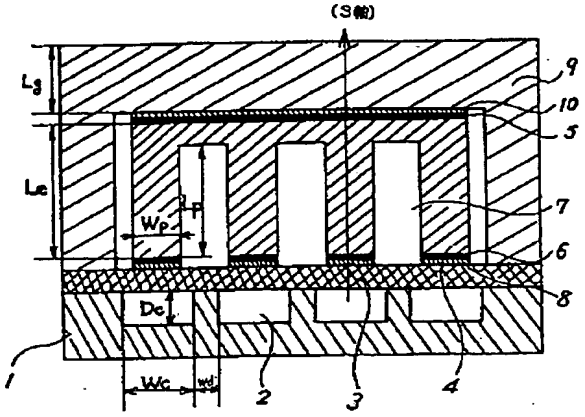
７・・・溝

９・・・剛性部材

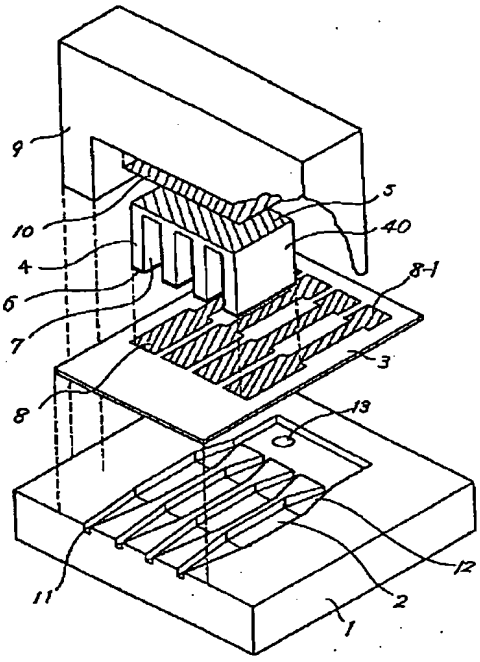
１１・・・ノズル

１２・・・供給路

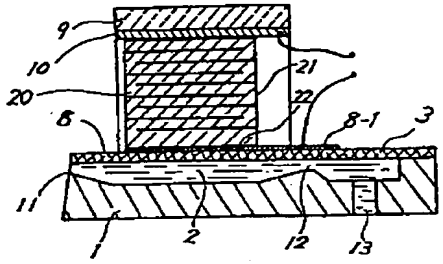
【図１】



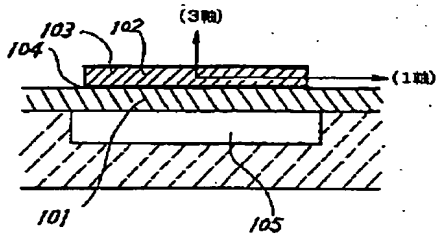
【図２】



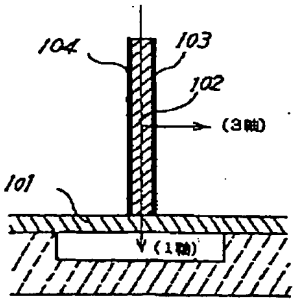
【図３】



【図４】



【図５】



【手続補正書】
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【補正方法】変更
【補正内容】
【００２１】
【発明の効果】以上のように本発明によれば、加圧室上の振動板の周縁部が剛性部材により固定されているため、加圧室に加わる圧力による加圧室を有する基板のたわみ変形を防止でき、クロストークが防止できる。また、圧電素子の電極を加圧室の長手方向に櫛歯状に交互に積層することにより、高密度に加圧室を配置できるにもかかわらず変位を大きくとることができ、さらに電極位置のバラツキの影響を小さくすることができる。

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] An ink jet arm head characterized by providing the following In piezoelectric material, while is exposed from the 1 side, and it is an electrode. While fixing a piezoelectric device which consisted of the other sides by arranging an electrode of a pole of another side to expose by turns to a rigid member, forming a slot for dividing the tip side into free one end of said piezoelectric device at least and dividing into two or more elements A pressurization means which polarization of said piezoelectric material was made to carry out in the inter-electrode direction of electric field and this inter-electrode direction, and gave a piezo-electric distorted constant d33, A substrate equipped with a nozzle orifice which injects ink from a diaphragm with which a periphery was supported by said rigid member, and a pressurized room pressurized through a diaphragm by said each element and a pressurized room while contacting the free end of two or more of said elements
[Claim 2] It is the ink jet arm head according to claim 1 which said piezoelectric device is arranged at a rectangle at a longitudinal direction of a pressurized room, and is characterized by carrying out the laminating of said electrode to the shape of a ctenidium by turns from a both-sides side of a longitudinal direction of a piezoelectric device.
[Claim 3] A manufacture method of an ink jet arm head characterized by providing the following In piezoelectric material, while is exposed from the 1 side, and it is an electrode. A production process which fixes to a rigid member a piezoelectric device with a piezo-electric distorted constant d33 which polarizes an electrode of a pole of another side exposed from the other sides in the inter-electrode direction of electric field where it has arranged by turns, and this direction, A production process into which a slot where said rigid member side serves as the depth is formed in free one end of said piezoelectric device in a predetermined pitch, and two or more elements are divided, and a production process which a tip and a pressurized room of each of said element are made to contact through a diaphragm, and fixes the periphery section to said rigid member

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the structure and its manufacture method of the multi-nozzle arm head which accumulated many especially nozzles on high density with respect to the on-demand mold ink jet arm head which used the piezoelectric device.
[0002]
[Description of the Prior Art] Since an on-demand mold ink jet is easy structure, development is furthered as an airline printer of a low price. Injection of ink was performed by deformation of a piezoelectric device and the deformation which originates to polarization in the deformation d31 of a perpendicular direction, i.e., a piezo-electric distorted constant, was used conventionally. For example, a piezoelectric transducer is shrunk with impressing voltage between the electrode 103 which polarization of the piezoelectric transducer 102 by which the laminating was carried out to the diaphragm 101 when the arm head using a conventional uni-morph was shown in drawing 4 is carried out to the sense of (3 Shaft) of drawing, and was prepared up and down, and 104 in a direction (one shaft), and the capacity of a lifting and a pressurized room 105 is made to deform bending deformation like bimetal by the diaphragm 101 and the piezoelectric device 102. Since deformation of a piezoelectric device was proportional to electric field and it was proportional to deformation lay length, the structure of the conventional example shown in drawing 4 enlarged electric field by impressing voltage in the thin (three shafts) direction, and deformation was enlarged by using the displacement of the direction where an element is long (one shaft).
[0003] Other conventional examples which, on the other hand, use deformation of the piezo-electric distorted constant d31 perpendicular to the direction of polarization are shown in drawing 5 . It arranges at right angles to the diaphragm 101 of the direction of a piezoelectric device (one shaft), and a diaphragm 101 is sagged in this example according to deformation of a direction (one shaft). Voltage is impressed in the thin direction, and he generates deformation in the long direction and is trying for driver voltage not to go up to it by this example as well as the example of drawing 4 .
[0004]
[Problem(s) to be Solved by the Invention] Although there was an advantage that driver voltage did not go up comparatively, in the conventional example described above, it was difficult to make [many] the number of nozzles and to integrate to high density. For example, in the example of drawing 4 , the lay length (one shaft) of a piezoelectric device became short, when the pressurized room was integrated [mm] about in ten [/], deformation could not be taken but driver voltage became high to remainder, and many piezoelectric devices needed to be made to adjoin in the example of drawing 5 , and it needed to arrange, and without short-circuiting the electrode of next doors, it was technically difficult to arrange [mm] in ten [/] moreover, and it did not almost have mass-production nature.
[0005] Therefore, the purpose of this invention is to offer an ink jet arm head without a cross talk while offering the multi-nozzle arm head integrated highly.
[0006] Moreover, other purposes of this invention are to offer the manufacture method of the

ink jet arm head which can connect a diaphragm with a piezoelectric device certainly.
[0007]
[Means for Solving the Problem] An electrode which is exposing an ink jet arm head of this invention steadily from the 1 side in piezoelectric material, While fixing a piezoelectric device which consisted of the other sides by arranging an electrode of a pole of another side to expose by turns to a rigid member, forming a slot for dividing the tip side into free one end of said piezoelectric device at least and dividing into two or more elements A pressurization means which polarization of said piezoelectric material was made to carry out in the inter-electrode direction of electric field and this inter-electrode direction, and gave the piezo-electric distorted constant d33, a substrate equipped with a nozzle orifice which injects ink from a diaphragm with which a periphery was supported by said rigid member while contacting the free end of two or more of said elements, a pressurized room which receives compression through a diaphragm by said each element, and a pressurized room — since — it is characterized by becoming.
[0008] Moreover, a manufacture method of an ink jet arm head of this invention A production process which while is exposed from the 1 side in piezoelectric material, and fixes to a rigid member a piezoelectric device with the piezo-electric distorted constant d33 which polarizes an electrode and an electrode of a pole of another side exposed from the other sides in the inter-electrode direction of electric field where it has arranged by turns, and this direction, a production process into which a slot where said rigid member side serves as the depth is formed in free one end of said piezoelectric device in a predetermined pitch, and two or more elements are divided, and a production process which a tip and a pressurized room of each of said element are made to contact through a diaphragm, and fixes the periphery section to said rigid member — since — it is characterized by becoming.
[0009]
[Example] The example of this invention is explained to details using a drawing below.
[0010] Drawing 1 shows the cross section perpendicularly cut to the shaft of passage as one example of this invention. 1 is formed in the surface as an ink passage fang furrow with Pori Sall John's substrate. The cross section of a pressurized room 2 is shown in drawing 1 among ink passage. The width Wd of 80 micrometers and **** is arranged by 20 micrometers, and the pressurized room is arranged for the width of face Wc of a pressurized room in 100-micrometer pitch. The depth Dc of a pressurized room is 30 micrometers. 3 is 10 micrometers in thickness in the Pori Sall John diaphragm, and the laminating is carried out to the substrate 1. It leaves the upper part and 4 is divided so that it may have electrodes 5 and 6 up and down by the wrap piezoelectric device and all pressurized rooms may be corresponded to each pressurized room by the slot 7. The diaphragm 3 and the piezoelectric device 4 are pasted up on the electrode 8 prepared in the surface of a diaphragm 3.
[0011] The width Wp of the portion corresponding to each pressurized room of a piezoelectric device is [300 micrometers and the inter-electrode distance Le of 50 micrometers and length Lp] 350 micrometers. 9 is the rigid member by which the laminating was carried out to the electrode 5 of a piezoelectric device 4 through the electrode 10, and both ends have pasted the character type of KO at deflection and a diaphragm 3, and it has the sufficiently thick thickness Lg compared with the thickness of a diaphragm 3. In this example, Lg is 1mm.
[0012] In the above configuration, drawing 2 explains the manufacture method.
[0013] A substrate 1 is made by injection molding and a nozzle 11, the supply way 12, and the ink passage of supply pipe 13 grade are formed with a pressurized room 2. After that, solvent bonding of the diaphragm 3 is carried out to the surface, and a head object is formed in it. The spatter of the metal thin film is carried out to the surface of a diaphragm 3, and the electrode 8 as shown in drawing by etching is formed. On the other hand, the rigid member 9 is made with Pori Sall John's injection molding, and forms an electrode 10 in an inferior surface of tongue by the spatter. The piezoelectric material 40 which furthermore has electrodes 5 and 6 on the upper surface and the inferior surface of tongue is pasted up on the rigid member 9, a slot 7 is formed by the diamond saw, and a piezoelectric device 4 is formed. Furthermore, the rigid member 9 and a piezoelectric device 4 are pasted up on a diaphragm 3, and wiring from the control circuit which is not illustrated by the posterior part 8-1 of an electrode 8 is performed.

[0014] Although the example of drawing 1 and drawing 2 shows the arm head of four nozzle numbers, the arm head of 24 nozzles thru/or 2000 nozzles can be created in fact.
[0015] Next, actuation of the above-mentioned example is explained.
[0016] Ink is filled in passage, and if the driving signal from the control circuit which is not illustrated between the electrode 8 and the electrode 10 is impressed, voltage will be impressed to a piezoelectric device 4 through electrodes 5 and 6. It records by distortion of epsilon=d 33 V/Le generating voltage in V, then a piezoelectric device 4 at this time, sagging a diaphragm 3 by this, pressurizing the ink in a pressurized room 2, and injecting from a nozzle 11. Since there is 100-time thickness Lg of the rigid member 9 compared with a diaphragm 3, flexural rigidity becomes 1003= 106 times, and most deformation of a piezoelectric device 4 gets across to a diaphragm 3 altogether. general — the flexural rigidity of a rigid member — 100 or more times of a diaphragm — it is — ****ing .
[0017] By using deformation of the direction of polarization of a piezoelectric device so that it may understand in the above-mentioned example, the piezoelectric device to many pressurized rooms can arrange easily, and the high integration of a multi-nozzle arm head of it is attained.
[0018] Moreover, since it is the twice of the value of the piezo-electric distorted constant d31 perpendicular to the direction of polarization thru/or 3 times the value of the same piezo-electric distorted constant d33 as the direction of polarization of this, although its distance between an electrode 5 and 6 is usually comparatively long, distortion has the advantage that it can take greatly.
[0019] In addition, in the above-mentioned example, although electrodes 5, 6, 8, and 10 are formed, the number of electrodes can be lessened by using an electrode 5, an electrode 10 and an electrode 6, and an electrode 8 as the same member. Moreover, the rigid member 9 can be served both as a metal, then an electrode 10. Moreover, although the slot 7 is put in to the middle of a piezoelectric device 4, this is for raising bonding strength with the rigid member 9 of a piezoelectric device 4. As long as bonding strength becomes enough, you may also cut the interaction of a ****** piezoelectric device deeply until all piezoelectric devices are separated, in order to lessen lowering and the loss of voltage.
[0020] The cross section cut along passage as other examples of this invention to drawing 3 is shown. Unlike the example of drawing 1 and drawing 2 , a piezoelectric device 20 is what carried out the nine-layer laminating of the 50-micrometer element, and electrodes 21 and 22 are formed between elements. A piezoelectric device 20 is arranged at a rectangle at the longitudinal direction of a pressurized room 2, from the supply road-side and nozzle side, electrodes 21 and 22 are formed in the shape of a ctenidium, and the laminating is carried out by turns. The electric field impressed to a piezoelectric device are advantageous in respect of driver-IC-izing, when driving a multi-nozzle which serves as abbreviation 1/9 compared with drawing 1 , becomes good less than [10V] to the example of drawing 1 having needed the driver voltage which is 80V, and is called especially 2000 nozzles.
[0021]
[Effect of the Invention] Since the periphery section of the diaphragm on a pressurized room is being fixed by the rigid member as mentioned above according to this invention, deflection deformation of the substrate which has a pressurized room by the pressure which joins a pressurized room can be prevented, and a cross talk can be prevented. Moreover, by carrying out the laminating of the electrode of a piezoelectric device to the shape of a ctenidium by turns at the longitudinal direction of a pressurized room, large displacement can be taken and effect of the variation in an electrode location can be further made small.
[0022] Furthermore, according to the manufacture method of this invention, the deflection of a diaphragm can be corrected and the tip of a piezoelectric device can be made to contact homogeneity by fixing the periphery section of a diaphragm by the rigid member at a diaphragm.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the cross section of drawing 2 showing one example of the ink jet arm head of this invention.
[Drawing 2] It is the perspective diagram showing one example of the ink jet arm head of this invention.
[Drawing 3] It is the perspective diagram showing other examples of the ink jet arm head of this invention.
[Drawing 4] It is the outline cross section of the conventional ink jet arm head.
[Drawing 5] It is the outline cross section of the conventional ink jet arm head.
[Description of Notations]
1 ... Substrate
2 ... Pressurized room
3 ... Diaphragm
4 20 ... Piezoelectric device
5, 6, 8, 10, 21, 22 ... Electrode
7 ... Slot
9 ... Rigid member
11 ... Nozzle
12 ... Supply way

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